Seminário de Equações Diferenciais Parciais

Diffusion Phenomena for Structurally Damped Waves

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Abstract. In this talk, we discuss the asymptotic profile of the solution to

$$\text{(C.P.)}\qquad \begin{cases} u_{tt} - \triangle u + 2b(t)(-\triangle)^{\delta} u_t = 0\,, & t \geq 0,\ x \in \mathbb{R}^n, \\ u(0,x) = u_0(x)\,, & x \in \mathbb{R}^n, \\ u_t(0,x) = u_1(x)\,, & x \in \mathbb{R}^n, \end{cases}$$

where $b(t) = \mu(1+t)^{\alpha}$, for some $\mu > 0$ and $\alpha \in [0,1)$. Here

$$(-\triangle)^{\delta} f := \mathfrak{F}^{-1}(|\xi|^{2\delta}\hat{f}), \qquad \text{for some } \delta \in (0,1],$$

represents a *structural damping*. If

$$2\delta < 1 + \alpha$$

then the asymptotic profile of the solution to (C.P.) is given by the solution to an anomalous diffusion problem,

$$\begin{cases} v_t + \dfrac{1}{2b(t)}(-\triangle)^{1-\delta} v = 0\,, & t \geq 0,\ x \in \mathbb{R}^n, \\ v(0,x) = v_0(x)\,, & x \in \mathbb{R}^n, \end{cases}$$

for a suitable choice of data $v_0 = v_0(u_0, u_1)$.

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References

[1] M. D'Abbicco, M.R. Ebert, *Diffusion phenomena for the wave equation with structural damping in the $L^p - L^q$ framework*, J. of Differential Equations, **256** (2014), 2307–2336, http://dx.doi.org/10.1016/j.jde.2014.01.002.

[2] M. D'Abbicco, M.R. Ebert, *Asymptotic profile of evolution operators with increasing-in-time structural damping*, in preparation.

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